

Remarks/Arguments:

The present invention relates to data transmission and reception. Specifically, modulated symbol levels are varied and transmitted based on communication control information.

On page 2, the Official Action has objected to claim 1 because it ends in a colon. Applicants have therefore amended claim 1 to end in a period. Withdrawal of the objection is respectfully requested.

On page 2, the Official Action rejects claims 1-7 and 12 under 35 U.S.C. 102(e) as being anticipated by Krishnamoorthy (USPN 6,490,270). On page 7, the Official Action rejects claims 8, 9 and 13-16 under 35 U.S.C. 103(a) as being unpatentable over Krishnamoorthy in view of Murakami (USPN 6,993,092). It is respectfully submitted, however, that the claims are patentable over the art of record for the reasons set forth below.

Krishnamoorthy teaches a transmission scheme which changes its constellation map (modulation level) on a time slot basis. Specifically, the constellation mapping scheme utilized per time slot is dependent on the channel quality. Murakami teaches a transmission apparatus which determines an interval of inserting a pilot symbol.

Applicants' invention, as recited by claim 1, includes a feature which is neither disclosed nor suggested by the art of record, namely:

... inserting a data symbol having a higher modulation level and a data symbol having a lower modulation level partially on a symbol basis based on a communication control information ...

Claim 1 relates to the insertion of high modulation level symbols and low modulation level symbols on a symbol by symbol basis. Specifically, a time slot consists of multiple symbols. Each symbol within the time slot is chosen to have a high modulation level or a low modulation level based on the quality of the channel. This feature is found in the originally filed application on at least page 20, lines 1-25 and also Fig. 2.

In Fig. 2, Krishnamoorthy shows frame structure 201 which includes time slots 203-1 through 203-64. Each of these time slots consists of a data part 205 and a guard interval 207. Data part 205 consists of **multiple** modulation symbols with **identical** constellation maps (modulation level). The constellation map of the symbols is identical because Krishnamoorthy determines the level of modulation based on each **time slot** (not on a symbol by symbol basis). For example, data part 205-1 of time slot 203-1 consists of multiple symbols that are all modulated in the same manner (for example QPSK). Each of the remaining time slots, for example, 203-2 and 203-3 may choose their own modulation scheme. Therefore, Krishnamoorthy teaches changing modulation technique on a per time slot basis. This feature is supported on column 4, line 17-23 of Krishnamoorthy ("*the number of bits per symbol may be changed on a **per time slot basis** regardless of the position of the data*").

Applicants' claim 1 is different than Krishnamoorthy, because the modulation level is selected on a symbol by **symbol basis** (not per time slot) ("*inserting a data symbol having a higher modulation level and a data symbol having a lower modulation level partially on a symbol basis based on a communication control information*"). For example, applicants' Fig. 2 shows a frame consisting of multiple time slots. Specifically, a particular time slot in Fig. 2 consists of 15 QPSK symbols followed by a single 16 QAM symbol and furthermore followed by 15 more QPSK symbols. Therefore, in a single time slot between the two pilot symbols, the modulation level is selected on a symbol by symbol basis (modulation level is not uniform throughout the entire time slot as shown in Krishnamoorthy). Furthermore, the modulation level of each symbol inside the time slot is based on communication control information. Specifically, statistical data about the communication quality of the channel is utilized to generate the communication control information to control the level of modulation on a symbol by symbol basis.

It is because applicants include the feature of "*inserting a data symbol having a higher modulation level and a data symbol having a lower modulation level partially on a symbol basis based on the communication control information*", that the following advantages are achieved. An advantage is that the appropriate modulation level may be chosen on a symbol by symbol basis in order to adapt to channel quality. Accordingly, for the reasons forth above, claim 1 is patentable over the art of record.

Claims 2, 3, 4 and 9 include similar features of claim 1. Thus, claims 2, 3, 4 and 9 are also patentable over the art of record for the reasons set forth above.

Claims 5-8 and 10-24 include all the features of their parent claims. Thus, claims 5-8 and 10-24 are also patentable over the art of record for the reasons set forth above.

In view of the amendments and arguments set forth above, the above-identified application is in condition for allowance, which action is respectfully requested.

Respectfully submitted,

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